

# Northumbria Research Link

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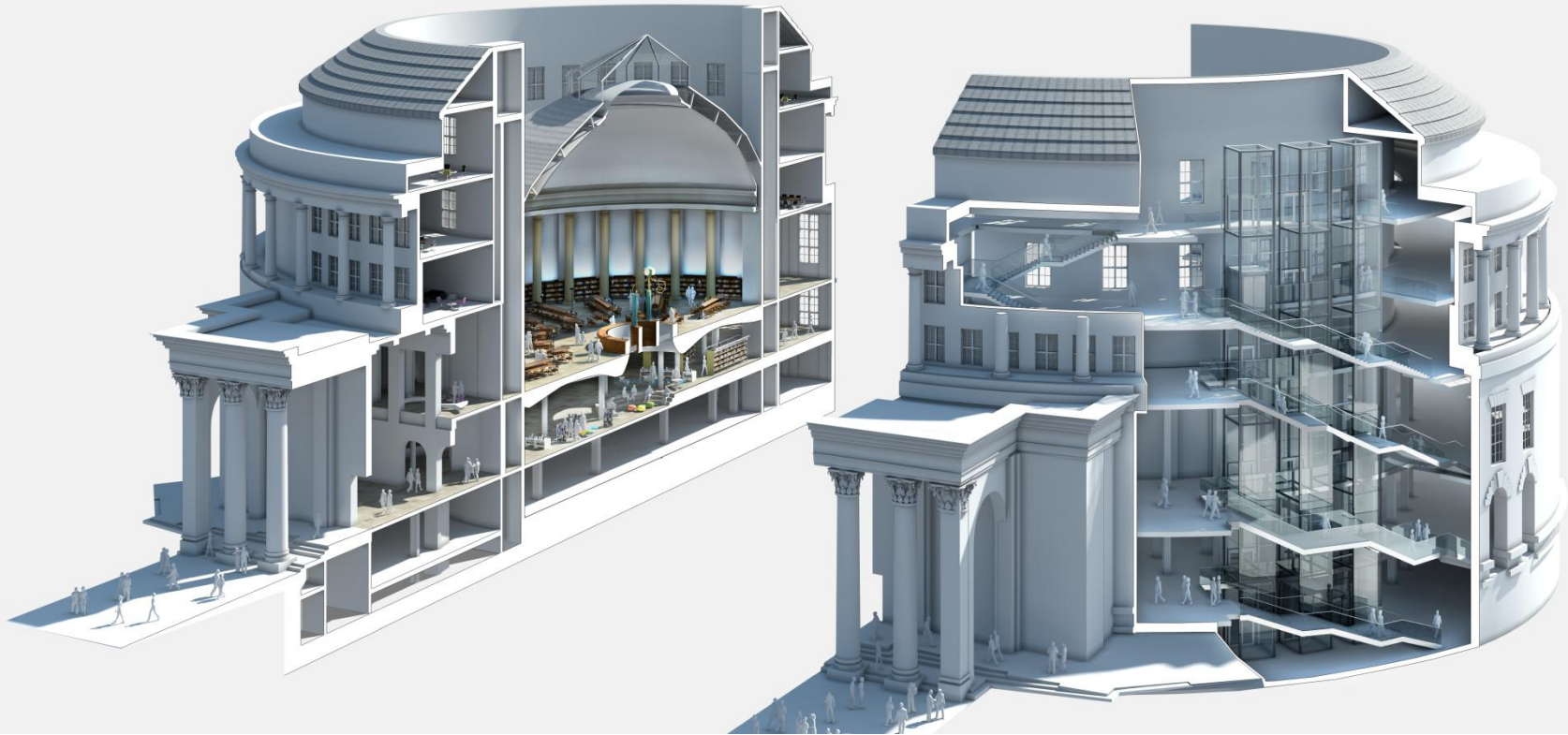


**Northumbria  
University**  
NEWCASTLE



**UniversityLibrary**

# Building Information Modelling in Quantity Surveying Education



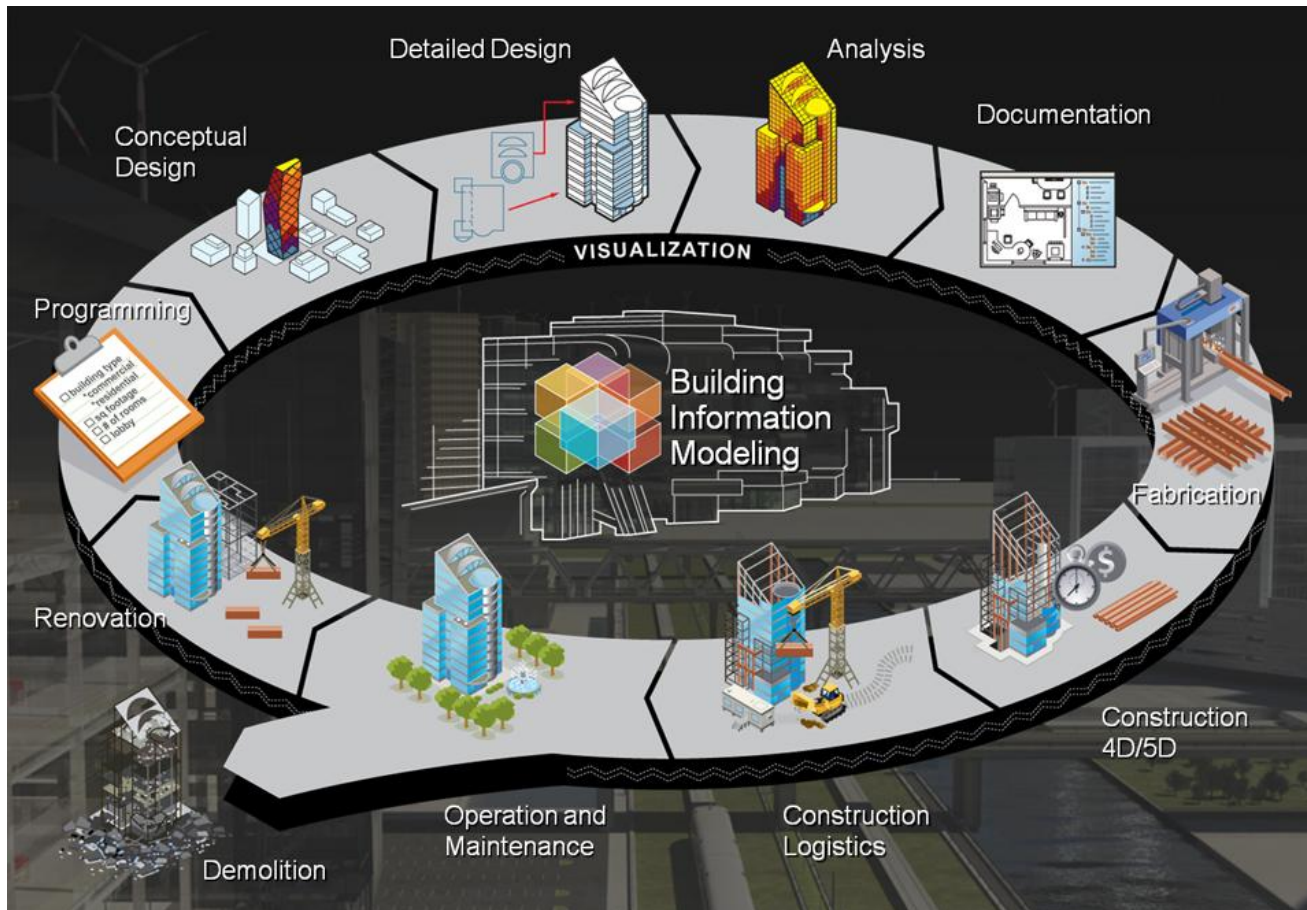
Kevin Thomas – Head of Department  
of Property and Surveying

**bim**academy

**northumbria**  
UNIVERSITY

**Ryder**  
[www.ryderarchitecture.com](http://www.ryderarchitecture.com)

# What is BIM ?



**“An integrated digital process providing coordinated, reliable information about a project throughout all phases, from design through construction and into operation”**

# What is BIM ?

## BIM benefits

**Clients**

**Designers**

**Contractors**

**Suppliers**

**Operators**

**By allowing**

**Better informed decisions**

**Quicker decision making**

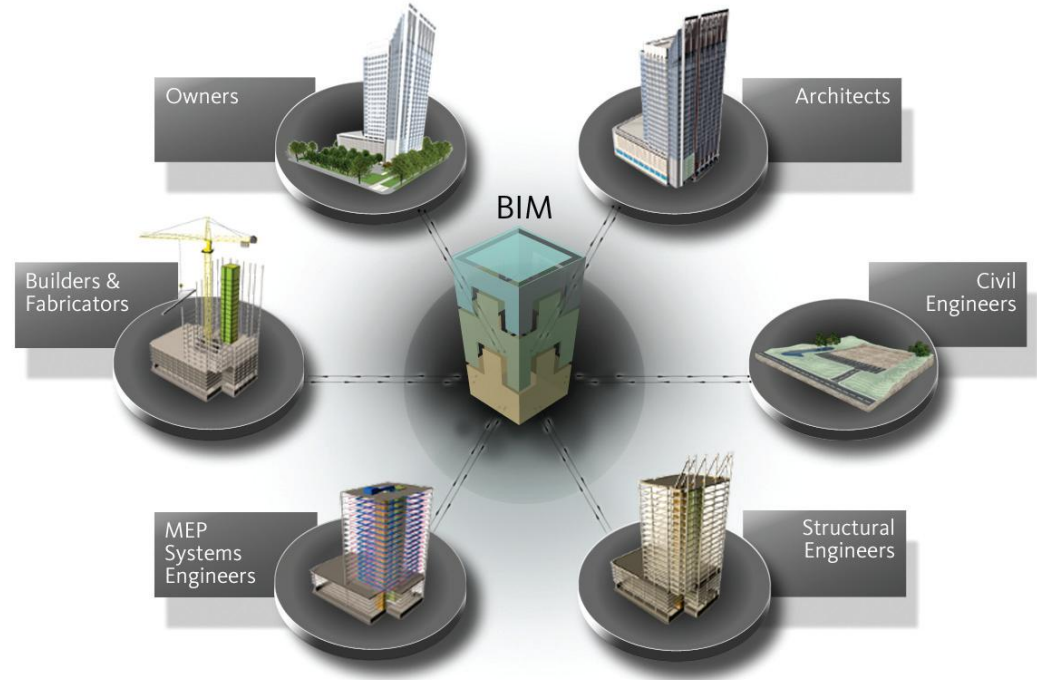
**Improved quality**

**Improved safety**

**Reduced waste**

**Greater cost certainty**

**Increased profitability**



# **What BIM is not**

**BIM is not 3D CAD**

**BIM is not a single building model**

**BIM is not a single software technology**

**BIM is not a replacement for good communication, team working and due diligence**

**THEREFORE critical that QS students and graduates are aware of and can use BIM comfortably and effectively and can act as “champions” to promote and spread**



# Why adopt BIM ?

**Building.co.uk** | Wednesday 07 September 2011

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## Worst orders figures on record suggest the worst on the ground is yet to come

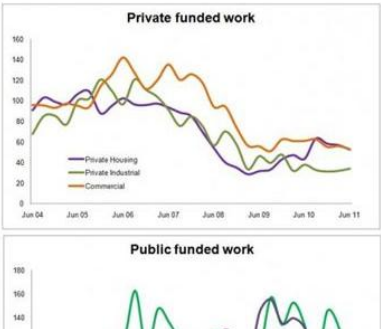
From: Brickonomics

Tag 2011, Brian Green, construction industry, infrastructure, new orders data, ONS, private funded work, public funded work

EMAIL SHARE COMMENT SAVE

Posted by: Brian Green  
2 Sep 11

The index, which represents a seasonally-adjusted price-adjusted measure of orders taken by contractors for new work has hit a record low. It stands at 57.5 for the second quarter of this year. Five years ago it stood at almost double that. (see graphs below)



**Private funded work**

**Public funded work**

From Brickonomics

Figuring out trends in housing, construction and property

Tags

Bank of England, construction, construction industry, construction output, Construction Products Association, Council of Mortgage Lenders, double dip, economy, forecast, forecasts, GDP, Halifax, house builders, house building, house prices, housing market, inflation, interest

**The UK Construction industry in 2011:**

**Fewer projects**

**‘More for less’**

**Low carbon agenda**

**Increased competition**

**Disjointed procurement**

**Technology ‘generation gap’**

**Lower fees**

**Staff reductions**

# **Why adopt BIM ?**

**30% of projects do not meet original programme or budget**

**92% of clients said that designers drawings are typically not sufficient for construction**

**37% of materials used in construction become waste**

**10% of the cost of a project is typically due to change orders**

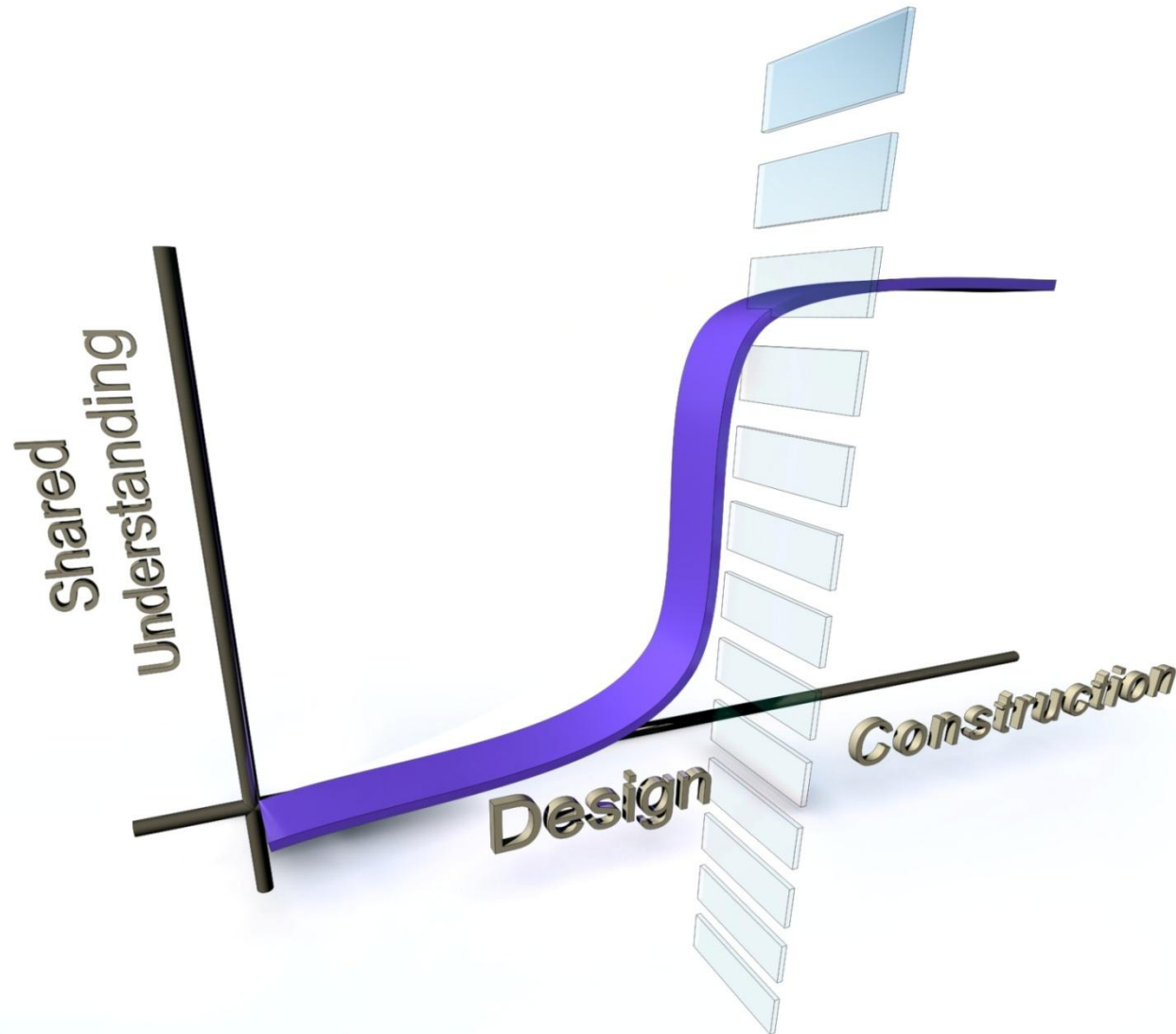
**38% of carbon emissions are from buildings not cars**

# Why adopt BIM ?

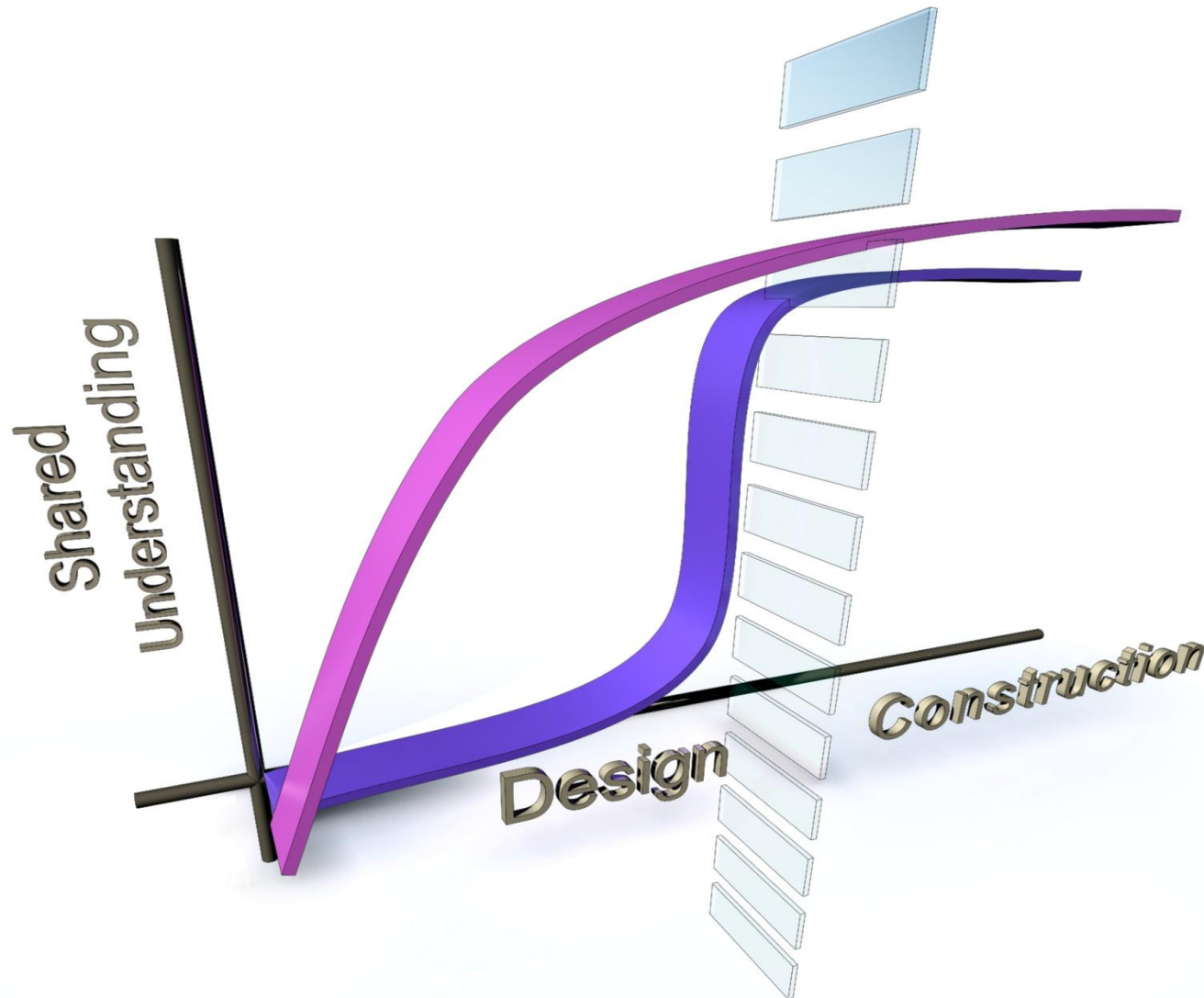




# Why adopt BIM ?



# Why adopt BIM ?



# Why adopt BIM ?



**“BIM is seen as having the greatest potential to transform the habits, and eventually the structure, of the industry”**

# Why adopt BIM ?

 **Cabinet**Office

## Government Construction Strategy

May 2011

**“Government will require fully collaborative BIM (with all project and asset information, documentation and data being electronic) as a minimum by 2016. A staged plan will be published with mandated milestones showing measurable progress at the end of each year”**

# **Where are we? – RICS Survey 2011**

**10% of QSs are using BIM regularly.**

**4% of QSs invest regularly in BIM training.**

**A further 10% of QSs are actively assessing BIM tools.**

**Surveyors who work on BIM projects generally felt using it would be appropriate on 2.5 times as many projects.**

**Respondents felt the RICS should provide BIM guidance and training.**

**QSs felt the barriers to BIM adoption were lack of client demand, lack of training, lack of application interfaces and lack of standards.**



# BIM technologies

Briefing



Design


















Analyse



Manage  
&  
Review



# BIM technologies – Quantity Surveyors

Briefing	
Design	
Analyse	
Manage & Review	<div>     </div> <div>     </div> <div>      </div>

# From Theodolites to Total Stations to Laser Scanning

**Point Cloud output of laser scanning**

**Use of high definition scanning equipment**

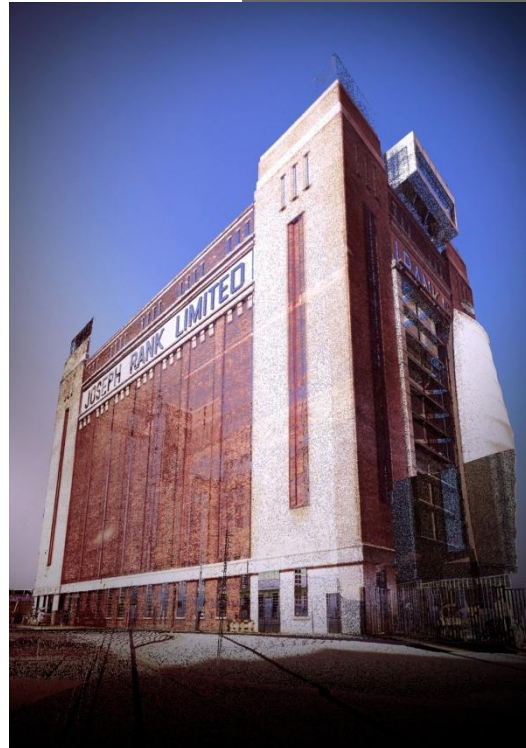
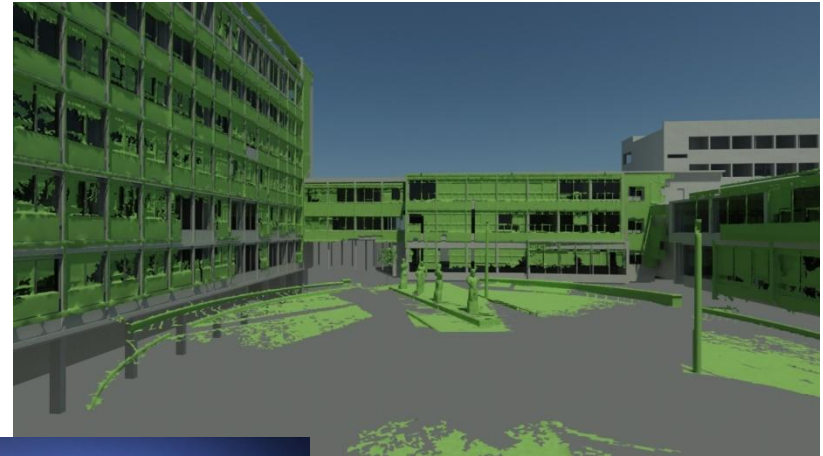
**Captures millions of survey points (3D)**

**Provides accurate as-built information**

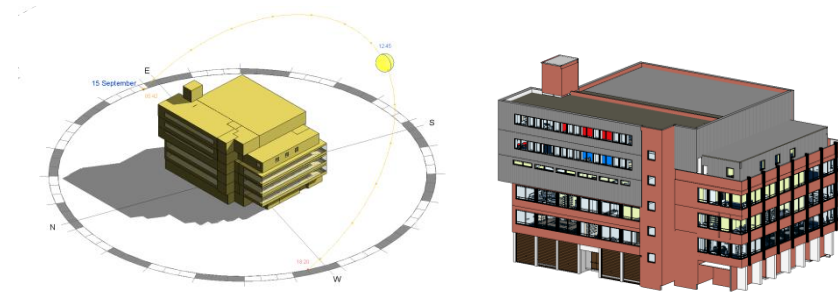
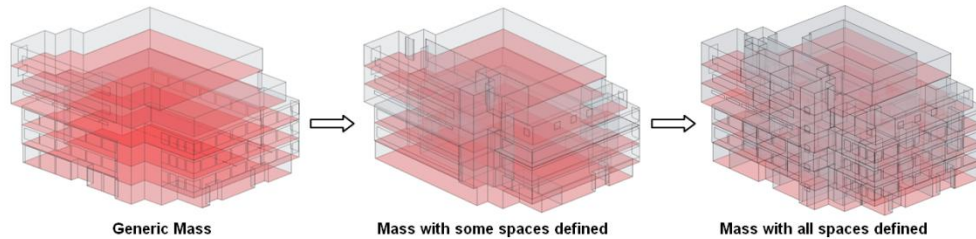
**Interoperable with BIM tools**

**Used as basis for design development**

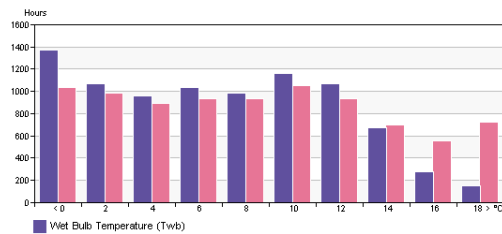
**Validates accuracy of existing model**



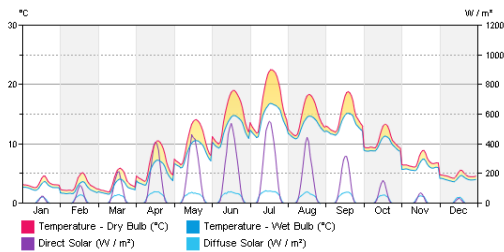
# Building performance analysis



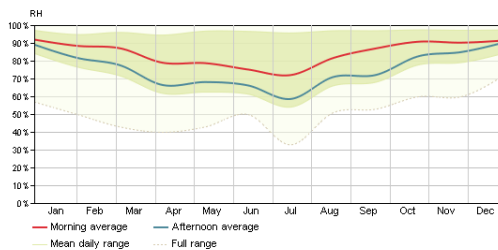
**Annual Temperature Bins**



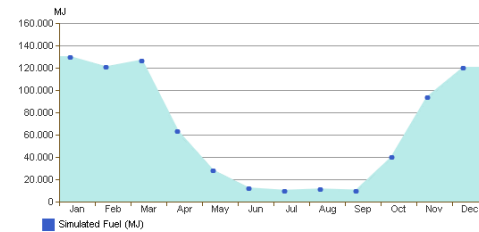
**Diurnal Weather Averages**



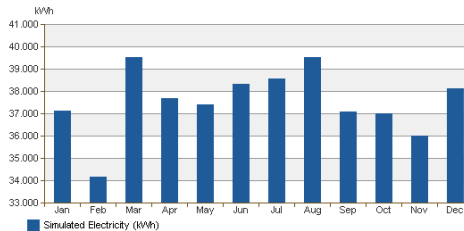
**Humidity**



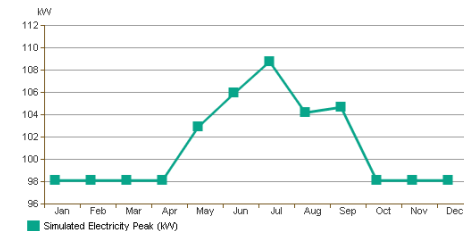
**Monthly Fuel Consumption**



**Monthly Electricity Consumption**



**Monthly Peak Demand**





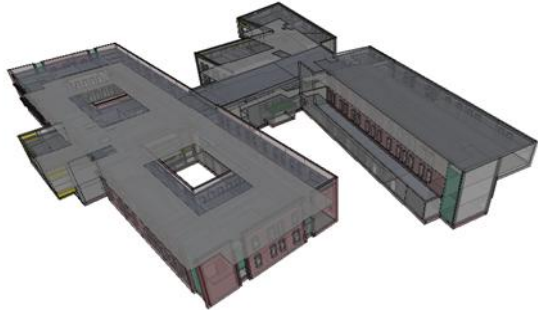
# Visualisation



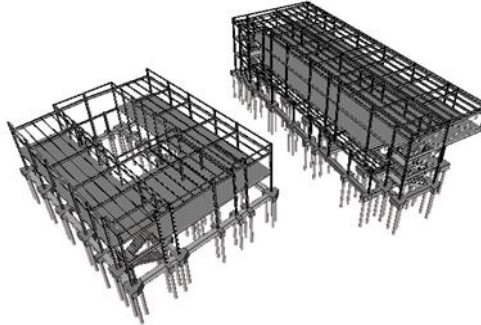


# Design Coordination

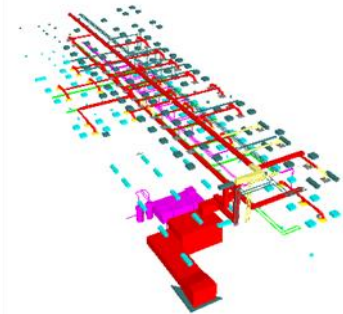
Architectural



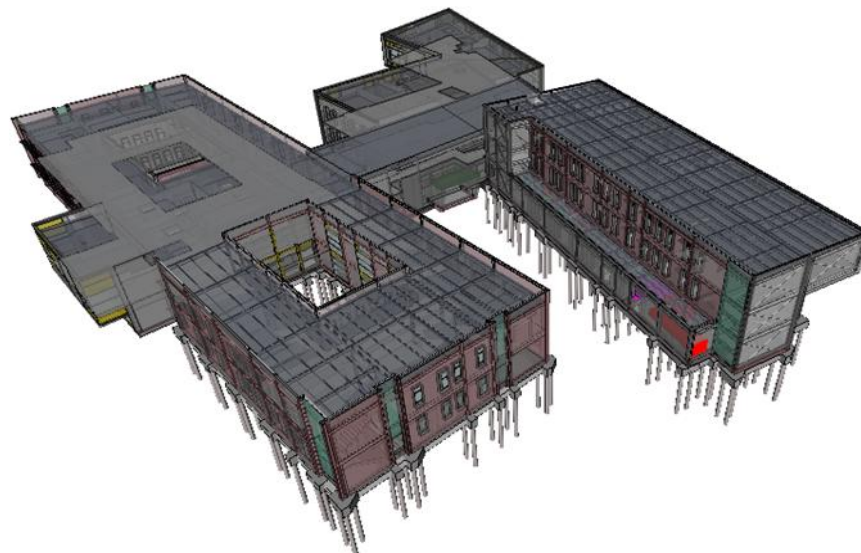
Structural



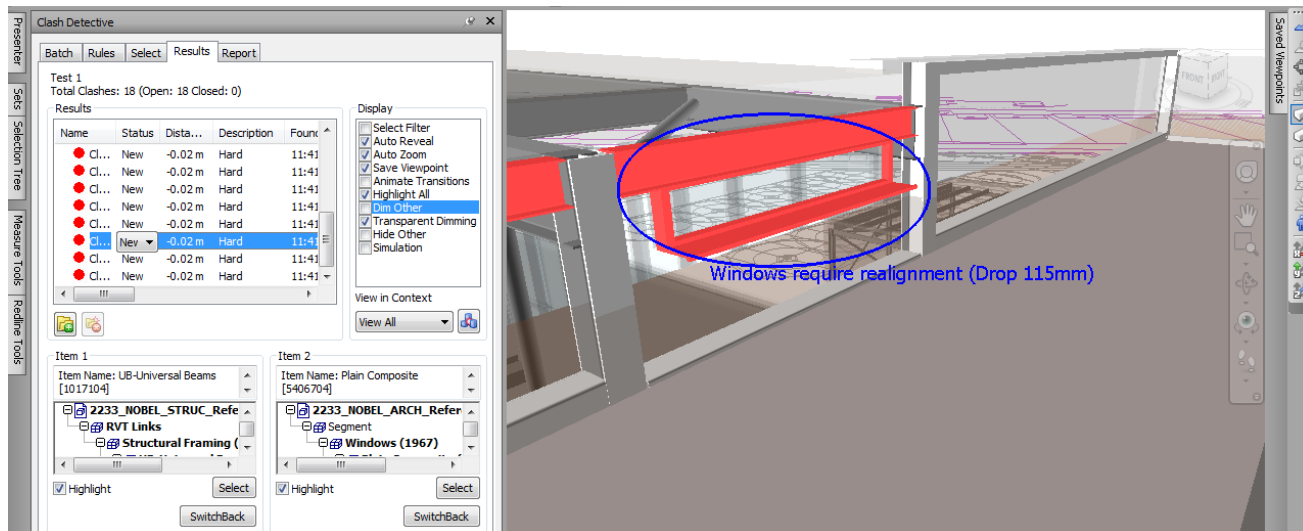
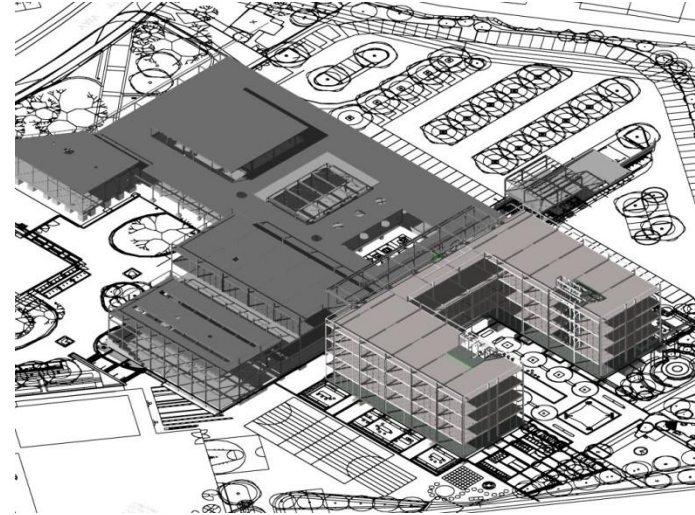
MEP



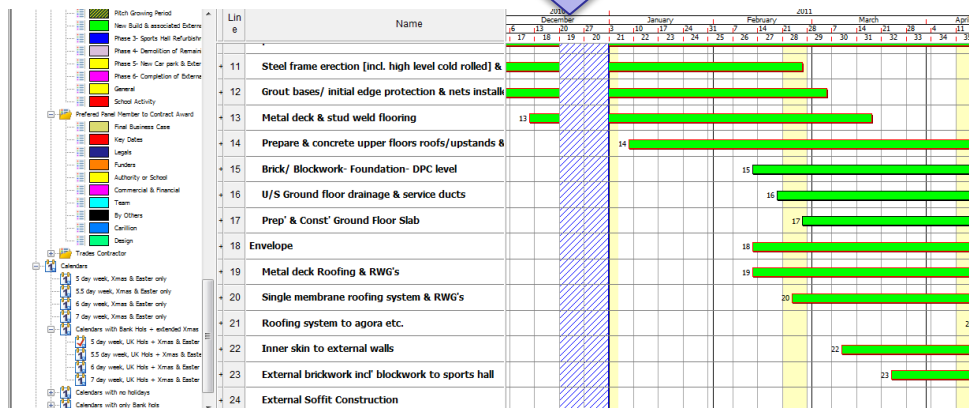
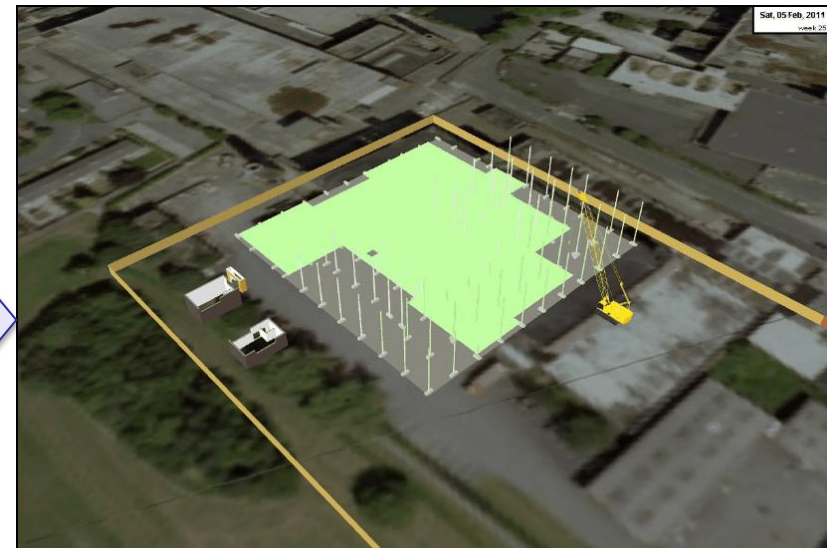
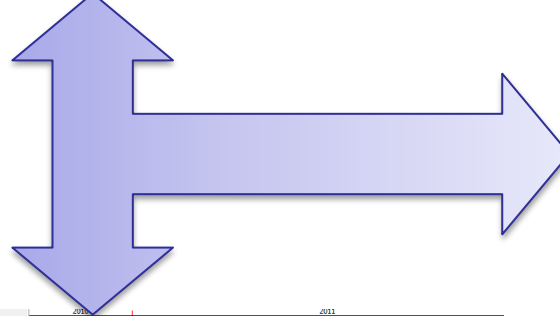
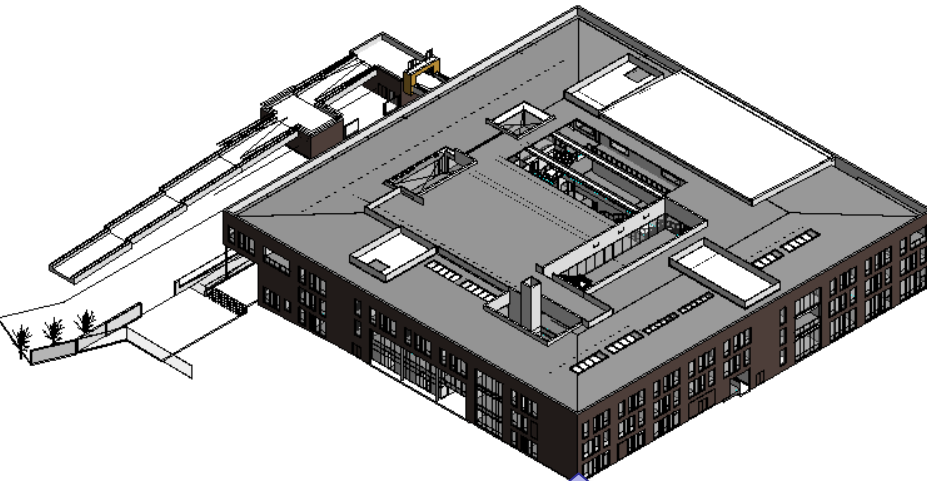
Multi-Discipline Model



# Design Coordination



# Model-based programming (4D)





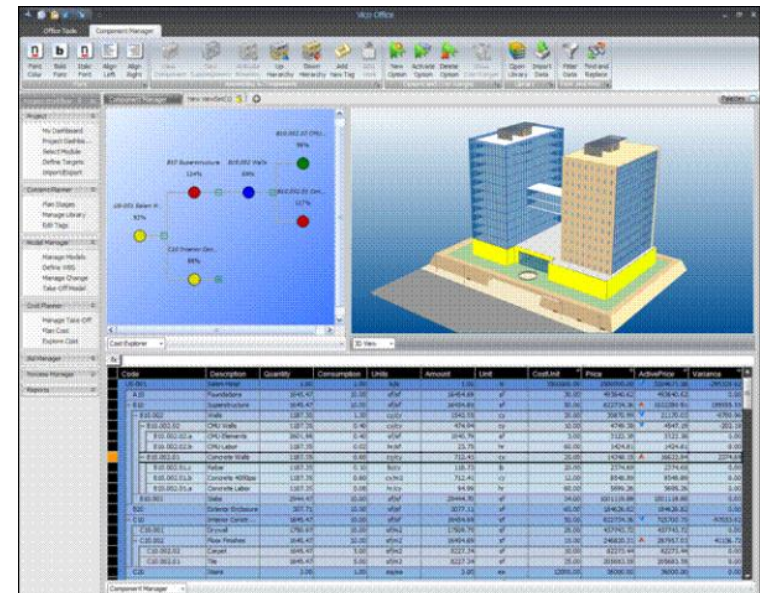
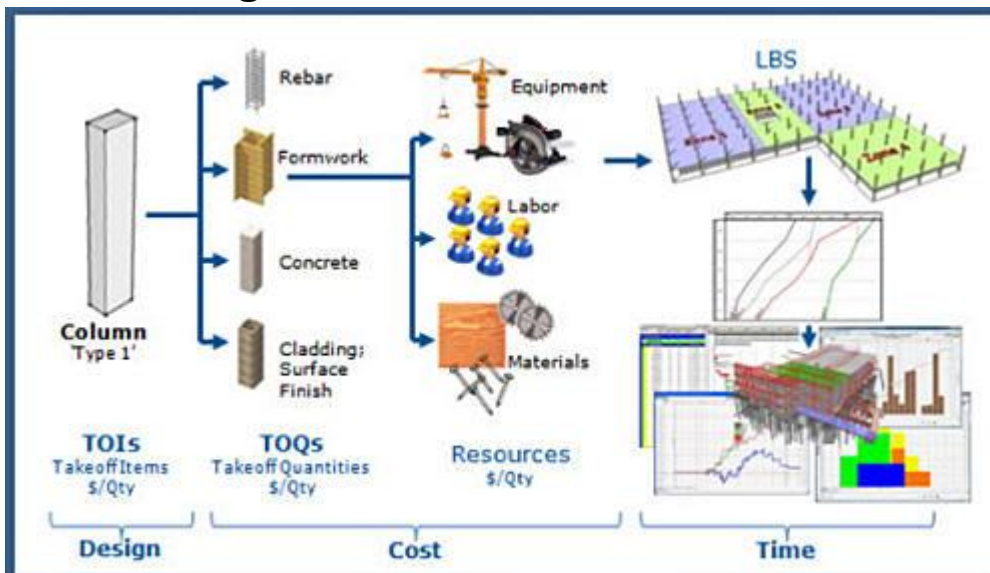
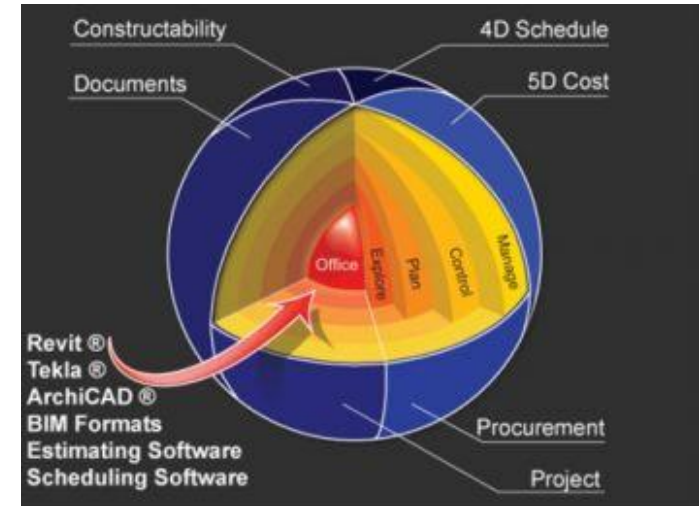
# Model-based cost management (5D)

5D = 3D Model + Time + Cost

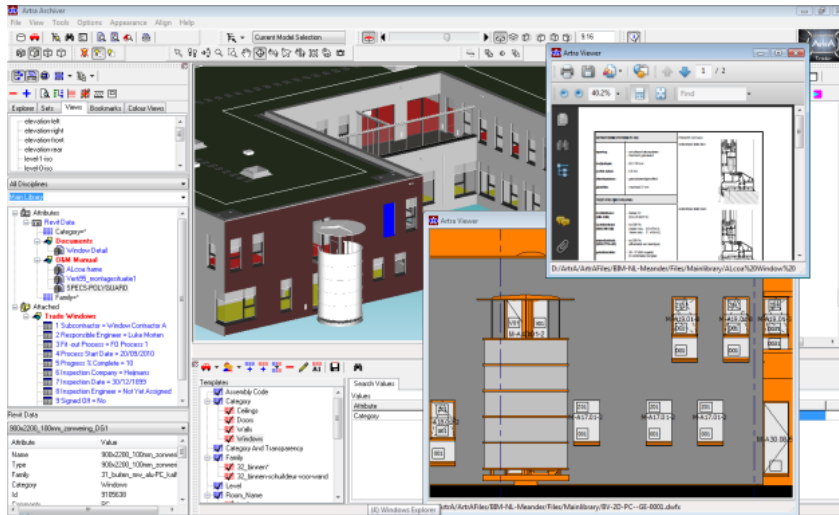
Quantities, Labour, Schedules, Equipment...

Comparative analysis

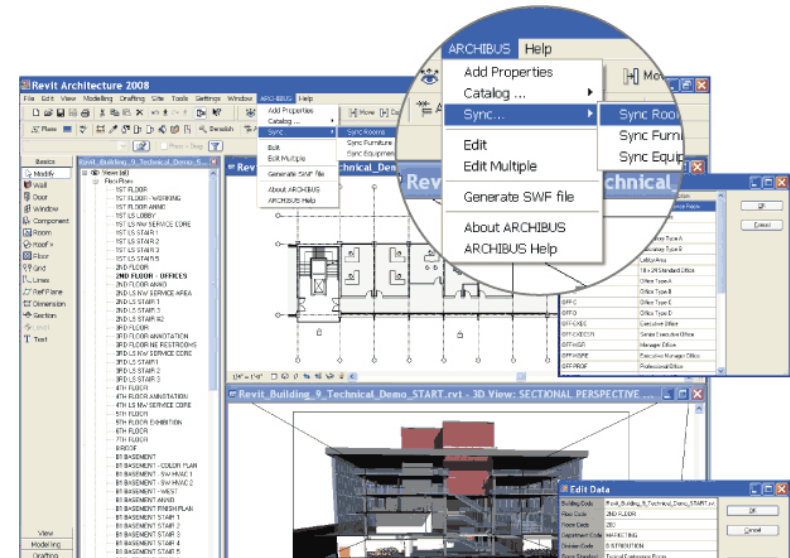
Interoperability with 3D modelling technologies



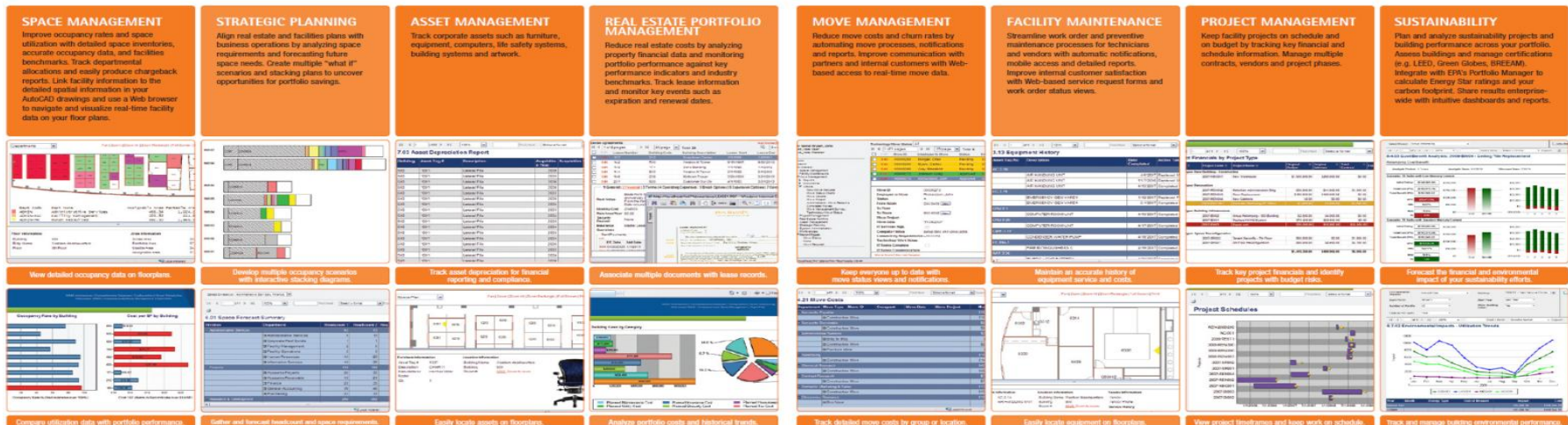
# 6D(model-based facilities management)



**ArtrA: Asset and Plant Lifecycle**

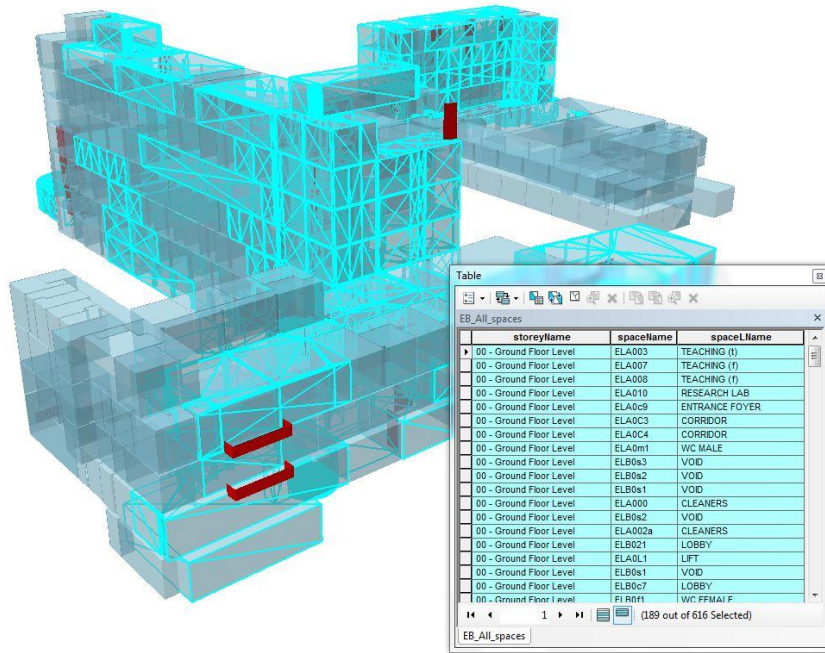


**ArchiBus**

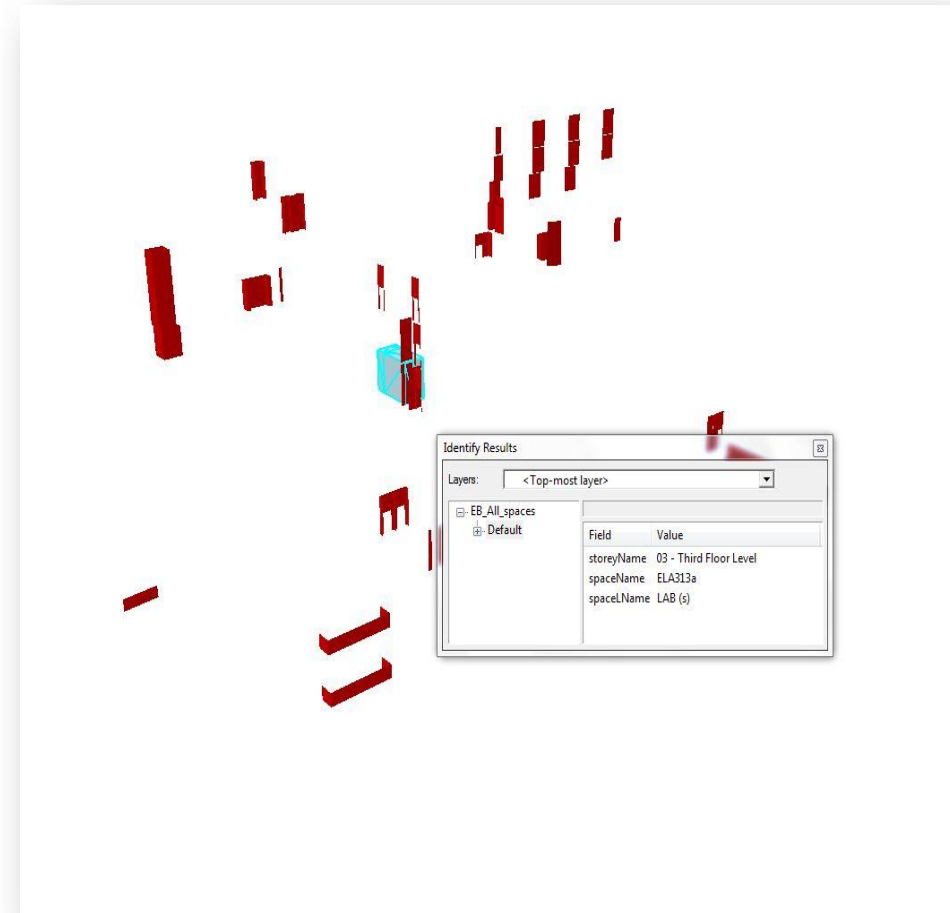




# 6D (model-based facilities management)



Northumbria University –  
Ellison Building – linking  
asbestos records with BIM  
and visualising in a wire  
frame model



<b>Relevance of BIM Workstreams</b>	<b>Quantity Surveyor</b>
<b>Space Programming</b>	
<b>Laser Scanning</b>	
<b>Pedestrian Simulation</b>	
<b>3D Modelling</b>	✓
<b>Room Loading</b>	✓
<b>Standardisation</b>	✓
<b>Information</b>	✓
<b>Visualisations</b>	✓
<b>Building Performance Analysis</b>	
<b>Design Coordination</b>	✓
<b>Systems building / Offsite manufacture</b>	✓
<b>4D Planning (time)</b>	✓
<b>5D Planning (cost)</b>	✓
<b>6D Planning (operations)</b>	✓

# BIM – Learning & Teaching

## Currently:

### **BE0890** – Measurement & Technology 2 (Year2)

- Visualisation

### **BE0778** – Construction Economics (Year 2)

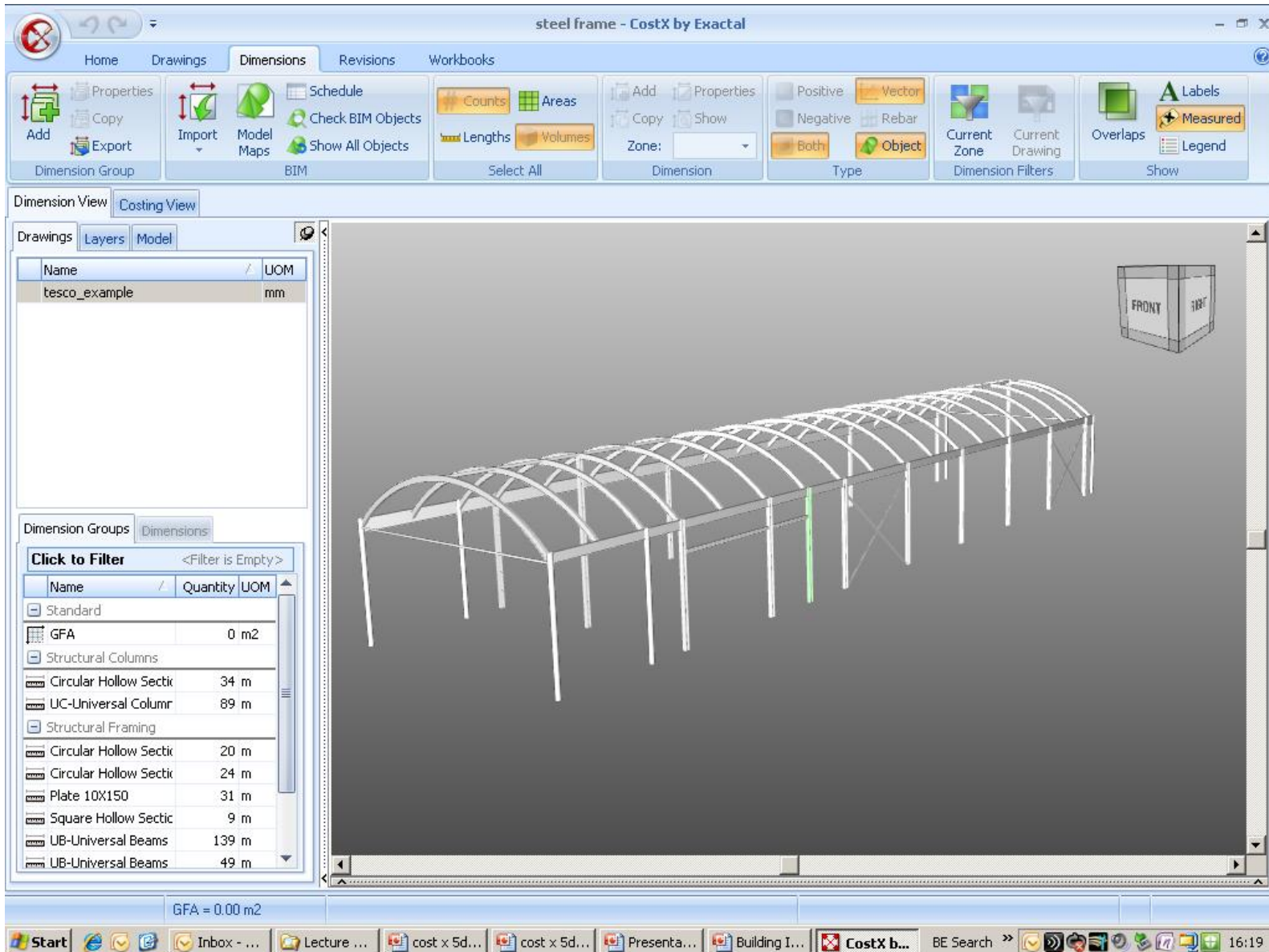
- 3d models (revit software)/Data scheduling/ quantification/ pricing
- Coursework

## Future:

BIM technology & collaboration techniques will be incorporated into QS modules for:

- Enhance the learning experience
- Up to date industry methods & techniques
- Development of QS specific skills
  1. Visualisation – 3d viewing
  2. Quantification
  3. Data Scheduling & pricing
  4. Multi disciplinary work based projects

# BIM – BE0890 Visualisation



The screenshot displays the CostX by Exactal software interface. The title bar reads "steel frame - CostX by Exactal". The ribbon includes tabs for Home, Drawings, Dimensions, Revisions, and Workbooks. The Dimensions ribbon is active, showing various tool groups like Dimension Group, BIM, Counts, Areas, Lengths, Volumes, Add, Properties, Copy, Show, Zone, Type, Dimension Filters, and Labels. The main view is a 3D model of a steel frame structure with a curved roof. A small 3D box labeled "FRONT" is visible in the top right corner of the model area. On the left, the "Dimension View" and "Costing View" tabs are shown. The "Layers" tab is active, displaying a table with the following data:

Name	UOM
tesco_example	mm

Below the table, the "Dimension Groups" and "Dimensions" tabs are visible. The "Dimensions" tab is active, showing a table with the following data:

Name	Quantity	UOM
Click to Filter <Filter is Empty>		
Standard		
GFA	0	m2
Structural Columns		
Circular Hollow Secti	34	m
UC-Universal Columr	89	m
Structural Framing		
Circular Hollow Secti	20	m
Circular Hollow Secti	24	m
Plate 10X150	31	m
Square Hollow Sectic	9	m
UB-Universal Beams	139	m
UB-Universal Beams	49	m

The status bar at the bottom shows "GFA = 0.00 m2". The Windows taskbar at the very bottom displays various open applications, including "Start", "Inbox - ...", "Lecture ...", "cost x 5d...", "Presenta...", "Building I...", "CostX b...", "BE Search", and a system clock showing "16:19".

# The BIM Academy



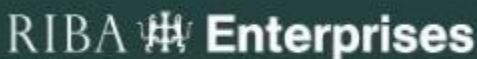
**Aims**

- Promote collaborative working
- Support the supply chain through facilitation, training and resource
- Innovation in partnership with industry
- Independence and impartiality
- Evidence based design, delivery and operation

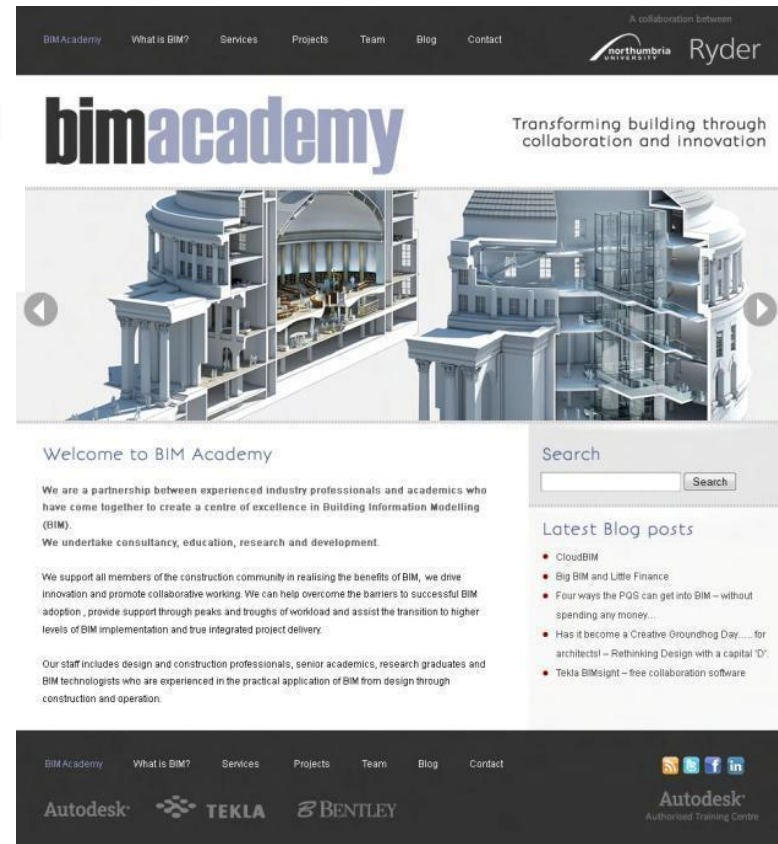
**Services** Research and Development, Education, Consultancy



Material change for  
a better environment



**University of Salford**  
A Greater Manchester University





# Why teach BIM ?



# **New MSc Building Design Management and Building Information Modelling**

**Commences September 2012 - 1 year FT, 3 years PT**

## **Aims of the programme**

- To provide a better understanding of the future of construction and how the industry will develop in a BIM enabled future
- To provide an understanding of the complexity of working in interdisciplinary teams and managing collaborative design and production
- To allow students to develop new skills which will enhance their ability to plan and execute design for construction, producing more efficient, sustainable and buildable projects
- To allow construction industry professionals to enhance their existing skills in order to improve project delivery through the use of Building Information Modelling and Management.
- To foster leadership, decision making, strategic thinking and communication

<http://www.northumbria.ac.uk/?view=CourseDetail&code=DTFBBD6>